

## Cells and Heredity

### 7-2 The student will demonstrate an understanding of the structure and function of cells, cellular respiration, and heredity. (Life Science)

#### 7-2.5 Summarize how genetic information is passed from parent to offspring by using the terms genes, chromosomes, inherited traits, genotype, phenotype, dominant traits, and recessive traits.

**Taxonomy level:** 2.4-B Understand Conceptual Knowledge

**Previous/Future knowledge:** Students have had no previous instruction in genetics, but they were introduced to inherited characteristics in 4<sup>th</sup> grade (4-2.4). In 6<sup>th</sup> grade (6-3.7), students compared learned to inherited behaviors in animals. Students will study in greater detail DNA and RNA and how these substances function and are replicated as part of high school biology.

**It is essential for students to** know that offspring may have the same physical characteristics, or *traits*, as their parents because genetic information (DNA) is passed from parent to offspring during sexual reproduction.

- Each sex cell (egg or sperm) of the parent organism (plant or animal) contains one-half of the genetic material needed to create a new organism.
- *Heredity* is the passing of traits from one generation to another, or *inheritance*.

#### *Chromosomes*

- A structure found in the nucleus of a cell that contains the genetic information (DNA).

#### *Genes*

- A segment of DNA found on a chromosome that determines the inheritance of a particular trait.
- Genes are responsible for the inherited characteristics that distinguish one individual from another.
- Genes for a specific trait generally come in pairs.
- One gene from the pair is called an *allele*.
- Genes may be expressed in two different forms.
  - *Genotype*—the set of genes carried by the organism.
  - *Phenotype*—the physical expression of the genes.

#### *Inherited traits*

- Characteristics that are passed from parent to offspring. Examples of inherited traits may be eye color, eye shape, hair type, or face shape.
- Some inherited traits are dominant and some are recessive.
  - *Dominant trait*—A trait that will always be expressed in the phenotype. Alleles for dominant traits are represented by capital letters.
  - *Recessive trait*—A trait that will only be expressed in the phenotype if two recessive alleles are present. In the presence of a dominant trait, the recessive trait will not be expressed. Alleles for recessive traits are represented by lowercase letters.

## Cells and Heredity

**7-2 The student will demonstrate an understanding of the structure and function of cells, cellular respiration, and heredity. (Life Science)**

**It is not essential for students to** know the stages of meiosis, or the structure of DNA and RNA. Sex-linked traits, mutations, incomplete dominance, codominance, polygenic inheritance, and genetic engineering are also not essential concepts for this indicator.

### **Assessment Guidelines:**

The objective of this indicator is to *summarize* how genetic information is passed from parent to offspring; therefore, the primary focus of assessment should be to generalize the major points about inheritance using the terms genes, chromosomes, inherited traits, genotype, phenotype, dominant traits, and recessive traits. However, appropriate assessments should also require students to *identify* the main components of genetic information; *explain* how genetic information passed from parents to offspring determines inheritance; or *compare* genotype and phenotype or dominant and recessive traits.